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OF

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FOR

**SYSTEMS AND METHODS IMPLEMENTING
INTERNET SCREEN DIALING FOR CIRCUIT
SWITCHED TELEPHONES**

SYSTEMS AND METHODS IMPLEMENTING INTERNET SCREEN DIALING FOR CIRCUIT SWITCHED TELEPHONES

FIELD OF THE INVENTION

The present invention relates generally to systems and methods for setting up calls between telephones and, more particularly, to systems and methods implementing computer screen dialing for setting up calls between telephones in a telephony network.

BACKGROUND OF THE INVENTION

Conventional electronic mail (e-mail) and Hyper-text Markup Language (HTML) documents have become popular means for sending data across the Internet. These electronic documents often include contact information for persons or entities sending the documents. This contact information typically includes telephone numbers and address information, and can further include conventional web addresses or e-mail addresses in conventional hyper-text format. The hyper-text addresses permit a reader of the document to “click” on the bolded and underline hyper-text, using a conventional mouse, and immediately access a website associated with the hyper-text using a conventional web browser. Hyper-text additionally permits a reader of a document to “click” on hyper-text of e-mail addresses to quickly compose and send e-mail to the e-mail addresses contained in the hyper-text. Conventional hyper-text, therefore, permits quick and easy contact with persons and entities contained in electronic documents.

Electronic documents, however, also often contain telephone numbers associated with persons or entities that a reader may wish to contact. In contrast to the use of hyper-text links, a reader of an electronic document conventionally is required to manually enter a telephone number, contained in the electronic document, into a telephone to enable the reader to contact a person or entity associated with the telephone number.

Therefore, there exists a need for a system and method that, similar to hyper-text links for e-mail and web-site addresses, permit quick and easy establishment of a telephone call with a telephone associated with a telephone number contained in an electronic document, using a computer input device, such as a mouse.

SUMMARY OF THE INVENTION

Systems and methods consistent with the present invention address this need by providing functionality within a computer that recognizes telephones numbers among characters entered into an electronic document and further permits a calling party to initiate a call with a party associated with the telephone number. Call initiation is achieved using a computer input device, such as a mouse, by positioning a pointer over a telephone number displayed in an electronic document and selecting the input device (e.g., "clicking" the mouse). After selection of the telephone number, the computer formulates a message containing the telephone number and a calling party number that can be used to establish a connection between a telephone associated with a calling party and a telephone associated with the telephone number of the called party.

In accordance with the purpose of the invention as embodied and broadly described herein, a method of making a telephone call using an electronic document includes receiving an electronic document that includes data representing at least one telephone number; selecting a telephone number from the electronic document; and signaling, via a packet-switched network, a telecommunication system to connect a call between the telephone number and a calling party telephone number in response to the selection of the telephone number.

In another implementation consistent with the present invention, a method of making a telephone call using an electronic document includes receiving, at a computer, an electronic document that includes data representing a telephone number; selecting a telephone number from the electronic document; connecting, if the computer includes a packetized telephone, a packet-switched call to a first telephone associated with the telephone number; and connecting, if the computer does not include a packetized telephone, a circuit-switched call between the first telephone and a second telephone associated with a calling party.

In a further implementation consistent with the present invention, a method of connecting a telephone call includes receiving a request from a calling party, via an input device of a computer, to connect a call to a first telephone; connecting, if the computer includes a packetized telephone, a packet-switched call to the first telephone; and connecting, if the computer does not include a packetized telephone, a circuit-switched call between the first telephone and a second telephone associated with the calling party.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate an embodiment of the invention and, together with the description, explain the invention. In the drawings,

5 FIG. 1 illustrates an exemplary network in which a system and method, consistent with the present invention, may be implemented;

FIG. 2 illustrates exemplary components of a computer consistent with the present invention;

10 FIG. 3 illustrates exemplary components of a hub device consistent with the present invention;

FIG. 4 illustrates a portion of an exemplary electronic document containing a 10 digit telephone number consistent with the present invention;

FIG. 5 is a flowchart that illustrates exemplary processing for identifying telephone numbers within an electronic document consistent with the present invention; and

15 FIGS. 6-8 are flowcharts that illustrate exemplary system processing for setting up a connection between two telephones consistent with the present invention.

DETAILED DESCRIPTION

The following detailed description of the invention refers to the accompanying drawings. The same reference numbers in different drawings identify the same or similar elements. Also, the following detailed description does not limit the invention. Instead, the scope of the invention is defined by the appended claims.

Systems and methods consistent with the present invention provide mechanisms that enable a calling party to initiate a call using a telephone number contained within an electronic document. Call initiation can be achieved, consistent with the present invention, using a computer input device, such as a mouse, through the positioning of a conventional pointer over a telephone number displayed in an electronic document and the selection by the input device (e.g., "clicking" the mouse). Selection of the telephone number initiates a process whereby a connection is established between a telephone associated with a calling party and a telephone associated with the telephone number of the called party.

EXEMPLARY NETWORK

FIG. 1 illustrates an exemplary network 100 in which a system and method, consistent with the present invention, connects a telephone call using electronic documents received at a computer. Network 100 may include a computer 105, a network 110, a hub device 125, a Signaling System Number 7 (SS7) data communication network 130, service switching points (SSPs) 135 and 140, and telephones 155 and 160. Telephones 155 and 160 can include any type of conventional telephony device known within the art.

Computer 105 may connect to network 110 using a wired 115, wireless 120 or optical connection link (not shown). Network 110 can include one or more packet-switched networks, including local area networks (LANs), metropolitan area networks (MANs), wide area networks (WANs), an intranet, or the Internet. Hub device 125 can include a network node that receives and processes data packets from network 110. Hub device 125 can be connected to network 110 and SS7 network 130 via wired 115, wireless 120 or optical

connection links.

SS7 network 130 can include a conventional network that uses SS7 signaling protocols for setting up telephone calls between service switching points 135 and 140. Network 130 can include conventional service control points (SCPs) and signal transfer points (STP) used for the conventional routing of calls between SSPs.

Service switching points 135 and 140 can include conventional network nodes typically associated with central office switching units (not shown) having SS7 messaging capability. Service switching points 135 and 140 connect with one another via link 150. Link 150 includes circuits for connecting calls between telephone 155 and telephone 160. Service switching points 135 and 140 may be connected to SS7 network 130 via links 145.

EXEMPLARY COMPUTER

FIG. 2 illustrates an exemplary computer 105 in which a system and method, consistent with the present invention, may be implemented for assisting in the set-up of a call between telephones 155 and 160. Computer 105 may include a processing unit 205, an input device 210, an output device 215, a Random Access Memory (RAM) 220, a Read Only Memory (ROM) 225, a communication interface 230, an optional packetized telephone peripheral 235, and a bus 240.

Processing unit 205 may perform all data processing functions for inputting, outputting, and processing of computer data. Input device 210 permits entry of data into computer 105 and includes one or more user interfaces (not shown), such as a keyboard, a mouse or the like. Output device 215 permits the output of data in video, audio, or hard copy

format.

RAM 220 provides semi-permanent working storage of data and instructions for use by processing unit 205. ROM 225 provides permanent or semi-permanent storage of data and instructions for use by processing unit 205. RAM 220 and ROM 225 may include large-
5 capacity storage devices, such as a magnetic and/or optical recording medium and its corresponding drive. Communication interface 230 includes conventional mechanisms for connecting computer 105 to network 110. Bus 240 interconnects the various components of computer 105 to permit the components to communicate with one another.

Packetized telephone peripheral 235 may further include a digital signal processor (DSP) 245, a digital-to-analog (D/A) converter 250, an analog-to-digital (A/D) converter 255, a speaker 260 and a microphone 270. DSP 245 may perform functions, such as packet buffering, voice coding, equalization, and audio data processing. D/A converter 250 includes conventional circuitry for converting digital audio signals to analog signal form for output, for example, via speaker 260. Speaker 260 includes a conventional mechanism for providing an
10 auditory output of the D/A-converted audio signals. A/D converter 255 includes conventional circuitry for sampling and converting analog audio input signals from
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microphone 270 to digital signal form. Microphone 270 includes a conventional mechanism for converting auditory input into analog signals.

EXEMPLARY HUB DEVICE

FIG. 3 illustrates an exemplary hub device 125, which is configured to process

packets received from computer 105, consistent with the present invention. Hub device 125 includes a communication interface 305, an output device 310, an input device 315, a processing unit 320, a ROM 325, a RAM 330, and a bus 335.

Communication interface 305 includes conventional mechanisms for connecting hub device 125 with network 110 and SS7 network 130. Output device 310 permits the output of data in video, audio, or hard copy format. Input device 315 permits entry of data into hub device 115 and includes a user interface (not shown). Processing unit 320 performs all data processing functions for inputting, outputting, and processing of data. ROM 325 provides permanent or semi-permanent storage of data and instructions for use by processing unit 320. RAM 330 provides semi-permanent working storage of data and instructions for use by processing unit 320. ROM 325 and RAM 330 may include large-capacity storage devices, such as a magnetic and/or optical recording medium and its corresponding drive. Bus 335 interconnects the various components of the hub device 125 to permit the components to communicate with one another.

EXEMPLARY DOCUMENT PROCESSING

FIG. 5 is a flowchart that illustrates exemplary processing, consistent with the present invention, for identifying and highlighting telephones numbers within an electronic document. As one skilled in the art will appreciate, the method exemplified by FIG. 5 can be implemented as a sequence of instructions and stored in ROM 225 of computer 105 for execution by processing unit 205.

To begin processing, computer 105 receives character input from input device 215

[step 500]. The character input can be entered, for example, via a keyboard connected to computer 105. Computer 105 determines if any of the received characters form a telephone number, such as, for example, a 10-digit telephone number in the NXX-NXX-XXXX format prescribed by the North American Numbering Plan (NANP) [step 505]. If so, computer 105
5 bolds and underlines the characters in the electronic document corresponding to the telephone number [step 510]. If the received characters do not form a telephone number, processing returns to step 500.

Optionally, computer 105 may further portray characters corresponding to the telephone number in a different color than other surrounding characters [step 515]. For
10 example, similar to hyper-text, computer 105 may portray the characters corresponding to the telephone number in the color blue. Computer 105 also associates data, containing the actual telephone number corresponding to the textual characters of the electronic document, with a location of the characters in the electronic document [step 520]. For example, if the textual characters representing the telephone number 444-555-6666 are positioned at location X
15 through location Y in the electronic document, then data, in a format usable for setting up a telephone call, is associated with location X through location Y of the document. Computer 105 then determines if the electronic document is complete [step 525]. Document completion can be indicated, for example, if a user of the computer initiates a conventional "close document" operation. If the document is not complete, processing returns to step 500. If
20 document completion is indicated, then processing ends.

EXEMPLARY CALL
SET-UP PROCESSING

FIGS. 6-8 are flowcharts that illustrate exemplary processing, consistent with the present invention, for setting up a circuit-switched connection between telephones 155 and 160.

To begin processing, computer 105 receives an electronic document containing characters comprising one or more telephone numbers and displays the electronic document using output device 215 [step 600] (FIG. 6). Computer 105 then determines, using conventional techniques, a location of a pointer in relation to displayed characters of the electronic document [step 605]. After determination of the location of the pointer, computer 105 determines if the pointer is located over a telephone number displayed on output device 215 [step 610]. If not, processing returns to step 605. FIG. 4 illustrates a portion 400 of an exemplary electronic document containing a telephone number 410 consistent with the present invention. As shown, a user of computer 105 positions the "pointer" 405 over the telephone number using, for example, a conventional mouse.

If the pointer is located over a displayed telephone number, then computer 105 determines if the telephone number has been selected [step 615]. As an example, a user of computer 105 may select a telephone number by "clicking" a conventional mouse when the pointer is located over the displayed telephone number. If the telephone has not been selected, processing returns to step 605. If telephone number has been selected, computer 105 retrieves the data, containing the telephone number, associated with the location of the telephone number characters in the electronic document [step 620].

Computer 105 determines if it includes a packetized telephone peripheral, such as

peripheral 235, among its active components [step 700] (FIG. 7). If so, computer 105 sets up a packetized phone call with the called party using packetized telephone peripheral 235 and conventional packetized telephony techniques [step 705]. If computer 105 does not include a packetized telephone peripheral 235, computer 105 then determines if a calling party number
5 has been previously stored in ROM 225 [step 710]. If not, computer 105 prompts the user, via output device 215, for example, to enter a calling party number [step 715]. Computer 105 then stores the entered calling party number in ROM 225 [step 720].

Computer 105 formulates a packet containing the calling party number and the selected telephone number as the called party number [step 725]. Computer 105 transmits the
10 formulated packet to hub device 125 via communication interface 230 and network 110 [step 730].

Hub device 125 receives the packet and extracts the called party number and calling party number from the packet [step 735]. Hub device 125 then signals SS7 network 130 to set-up a call between a telephone associated with the called party number (e.g., telephone
15 155) and a telephone associated with the calling party number (e.g., telephone 160) [step 740]. In response to the signaling from hub device 125, SS7 network 130 rings telephone 160 associated with the calling party number [step 800] (FIG. 8). SS7 network 130 then determines if the calling party answers telephone 155 [step 805]. If the calling party does not answer telephone 160 after a specified period of time, SS7 network 130 returns, via hub
20 device 125, a message to computer 105 requesting the user to re-enter a calling party number [step 810]. However, if the calling party does answer, SS7 network 130 rings telephone 155

associated with the called party number [step 815].

SS7 network 130 next may determine if the called party answers telephone 155 [step 820]. If so, SS7 network 130 performs conventional call set-up between telephone 160, associated with the calling party number, and telephone 155, associated with the called party number [step 825]. If the called party does not answer telephone 160, then the call fails and processing ends. For example, if telephone 155 is involved in another call, processing typically ends with SS7 network 130 returning a "busy" signal to telephone 160.

CONCLUSION

Systems and methods consistent with the present invention provide mechanisms that recognize telephone numbers among characters entered into an electronic document and permit a calling party to initiate a call with a party associated with the telephone number. The present invention, therefore, permits quick and easy establishment of a telephone call with a telephone associated with a telephone number contained in an electronic document using a computer input device, such as, for example a mouse.

The foregoing description of exemplary embodiments of the present invention provides illustration and description, but is not intended to be exhaustive or to limit the invention to the precise form disclosed. Modifications and variations are possible in light of the above teachings or may be acquired from practice of the invention. For example, while certain components of the invention have been described as implemented in hardware and others in software, other configurations may be possible. Additionally, the present invention is applicable to establishing calls via cell phones, VOIP, video conferencing devices, or any

